

Appl. No. 10/679,168
Reply to Office action of August 06, 2007.

REMARKS

In the final office action dated August 06, 2007, the Examiner rejected claims 1-21. The Applicants respectfully request reconsideration of the application by the Examiner in light of the following remarks.

Rejections under 35 U. S. C § 102 (b)

The Examiner has rejected claims 1-4, 6, 8-11 and 14-16 and 17-21 under 35 U.S.C. § 102 (b) as being anticipated by Hsu et al., U.S Patent 4,721,556 (hereinafter Hsu).

Applicants respectfully submit that Hsu does not disclose all elements of independent claims 1, 15, 16, 17 and 21.

In the section "Response to Arguments", the Examiner submits that the metal interconnect of Hsu reads on the stress inducer as claimed in present invention. Applicants would respectfully disagree with the examiner.

Hsu is missing features recited by independent claims 1, 15, 16 17 and 21.

First, paragraph 25 of the application as filed reads *inter alia*, "a stress inducer 42, for example a plurality of exemplary reinforcement structures are applied to at least one of the operating layers, for example, the anode 14". Interconnect 22, as described in paragraph 21 is a separate structure. This fact is brought out more clearly in Fig. 4, which shows both an interconnect 22 and a stress inducer 42. Thus, it is clear that the stress inducer is a reinforcement structure, different than the interconnect.

The Examiner's argument likens the stress inducer with the interconnect. The Applicants would like to highlight that the embodiments of current invention provide a fuel cell assembly and a method of making the same, that allows for mitigating the thermo-mechanical stress induced in the operating layers of the fuel cell without compromising its operational effectiveness. As described in paragraph 24 of the specification as filed, describes *inter alia*, "Sources of mechanical stress include: CTE mismatch stress arising from mechanical bonding through sealing or otherwise, of the fuel cell to its supporting interconnect having a different CTE at a temperature different from the operating and shut-down temperatures of the unit"

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(emphasis added).

Hsu describes on column 4, lines 40-45, the various materials used in making the components of fuel cell. Accordingly Hsu describes an electrolyte plate made of stabilized zirconia, oxidizer electrodes made of perovskites, fuel electrodes made of cermets, and interconnects made of metal such as Inconel, a nickel alloy, and a platinum alloy, or made of non-metallic conductor such as silicon carbide.

Thus the material of interconnect and different layers is different. This in turn leads to results in different coefficient of thermal expansion (CTE), and thus to the CTE mismatch stress as highlighted in paragraph 24, as shown above.

Thus, interconnect of Hsu, although metallic, cannot alone function as a stress inducer. Reinforcement structures, such as those presented by embodiments of present invention are required to mitigate the problem of CTE mismatch.

Hence the Applicants submit that the interconnect of Hsu cannot anticipate the metallic stress inducer elements as provided by the embodiments of current invention.

Second, as agreed by the Examiner on page 4 of the office action, "Hsu teaches the prestressed reinforcement structure and brittle layer but fails to teach a wire-structure, fiber structure, wire-mesh structure or perforated sheet structure embedded in the brittle layer"

Hsu describes a method for assembling converter stacks at high temperature which serves not only to fuse the adjacent plates together, but also places the electrolyte plates together (col. 8, lines 14-30). This technique is useful when metallic interconnector plates are disposed between zirconia electrolyte plates since it takes advantage of the large differences in their respective thermal coefficient of expansion.

In contrast, Claims 1, 15, 16, 17 and 21 of present application describe fuel cell assembly and method of making the same using a stress inducer for inducing planar compressive stress to at least one of the brittle layers such as anode, cathode or electrolyte. The details of this additional physical element in the fuel cell assembly are disclosed in the specification as filed, at Paragraph 25 and Fig. 3. Hsu neither suggests nor discloses a stress inducer, which could also be embedded on to a brittle layer.

Hence Hsu does not disclose all elements of independent claims 1, 15, 16, 17 and 21. Claims 2-4, 6, 8-11, 14 and 18-20 depend directly or indirectly from claim 1 and 17. The

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Applicant respectfully submits for the reasons discussed above that claims 2-4, 6, 8-11, 14 and 18-20 are similarly allowable over the applied reference and request withdrawal of foregoing rejections under 35 U. S. C § 102 (b).

Rejections under 35 U. S. C § 103 (a)

Claims 5, 7, 12 and 13 are rejected under 35 U. S. C § 103 (a) as being unpatentable over Hsu in view of Bothwell at al. US Patent Number 4,276,331 (herein after Bothwell). Applicant respectfully traverses the rejection.

First, Claims 1 is allowable as discussed in the previous sections. Claims 5, 7, 12 and 13 depend directly or indirectly from claim 1 and are similarly allowable.

Second, the examiner has tried to combine the fuel cell of Hsu with Bothwell, citing that it describes a metal grid coated with a ceramic slurry.

Bothwell describes at column 3, lines 20-25 and column 6, lines 62-65 that the composite can be inserted in a mold and cast around with molten metal, providing a simple method for insulating cast parts. Thus Bothwell involves casting of the slurry around the metal grid and sintering it at high temperatures, see column 10, line 52-56.

In contrast, the embodiments of current invention describe "depositing said brittle layer over said reinforcement structure at a pre-determined deposition temperature". Deposition quite is a different process as compared to sintering. The major difference is that deposition process allows a layer by layer accumulation of the substance on substrate. This is in accordance with paragraph 27 and 30 of the specification as filed. The difference in deposition techniques also imparts difference in properties of the product prepared as is well known. Thus the techniques described in Bothwell cannot provide functionality as assumed by the Examiner and hence the Applicant request removal of the rejections based on a hypothetical combination of Hsu and Bothwell.

Third, the Applicants submit that Hsu and Bothwell are from different technology domains.

Request Removal of Non-Analogous Art.

Hsu describes "Electrochemical Converters And Combined Cycle Systems", whereas Bothwell

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describes "Metal-Ceramic Composite And Method For Making Same". Further, Hsu describes an SOFC system and a method of making the same. Bothwell, on the other hand, describes the composite that has particular utility as thermal insulation for internal combustion engine exhaust systems.

For the teachings of a reference to be prior art under 35 U.S.C. § 103, there must be some basis for concluding that the reference would have been considered by one skilled in the particular art working on the particular problem with which the invention pertains. In re Home, 203 U.S.P.Q. 969, 971 (C.C.P.A. 1979). The determination of whether a reference is from a non-analogous art is set forth in a two-step test given in Union Carbide Corp. v. American Can Co., 724 F.2d 1567, 220 U.S.P.Q. 584 (Fed. Cir. 1984). In Union Carbide, the court found that the first determination was whether "the reference is within the field of the inventor's endeavor." If it is not, one must proceed to the second step "to determine whether the reference is reasonably pertinent to the particular problem with which the inventor was involved." In regard to the second step, Bott v. Fourstar Corp., 218 U.S.P.Q. 358 (E.D. Mich. 1983) determined that "analogous art is that field of art which a person of ordinary skill in the art would have been apt to refer in attempting to solve the problem solved by a proposed invention." "To be relevant the area of art should be where one of ordinary skill in the art would be aware that similar problems exist." *Id.*

For at least these reasons among others, the Applicant request removal of above rejections under 35 U. S. C § 103 (a).

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Summary

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Should the Examiner believe that anything further is needed to place the application in even better condition for allowance, the Examiner is requested to contact applicant's undersigned representative at the telephone number below.

Respectfully submitted,



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